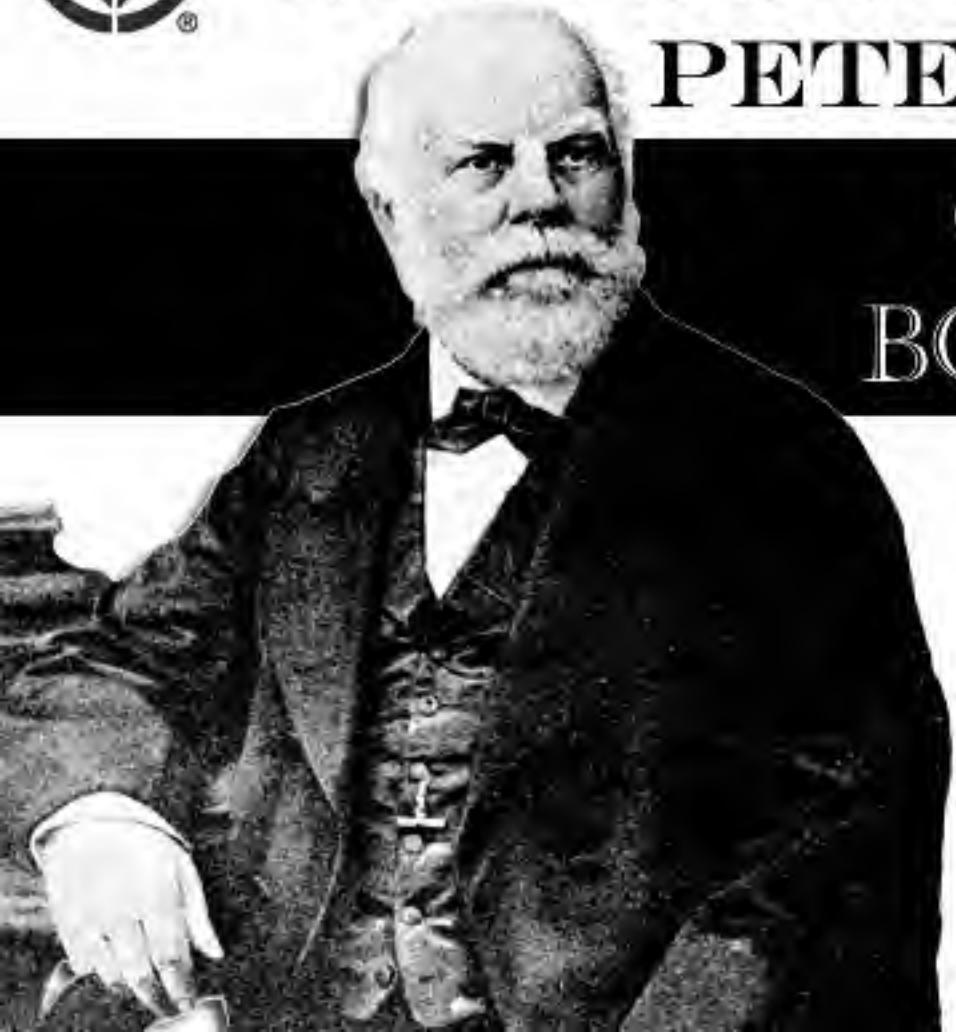




MISSOURI BOTANICAL GARDEN

PETER H. RAVEN LIBRARY

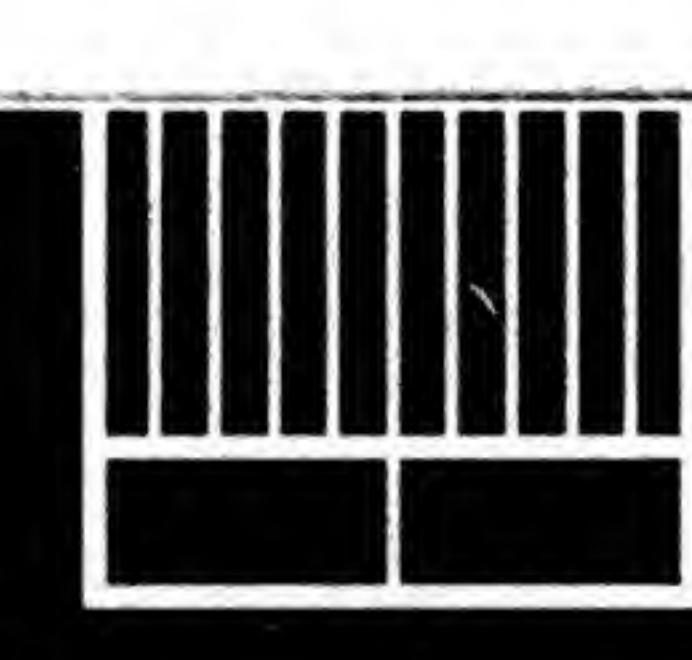


GEORGE ENGELMANN BOTANICAL NOTEBOOKS

Pagination Note:
Since many of the items lack a specific page number, the page number displayed online refers to the sequentially created number each item was given upon cataloging the materials.

Dr. Caves' Notes
on Arizona *Cactaceae*

1885



0

1

2

3

4

5

6

7

8

9

10

cm

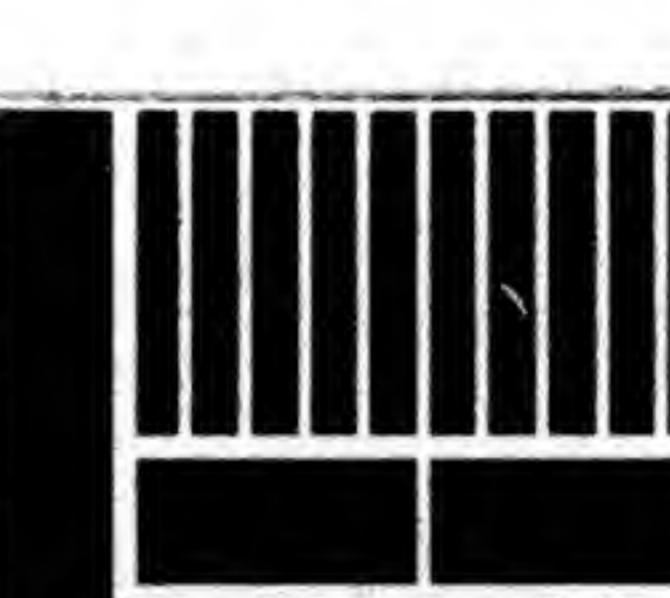
copyright reserved



MISSOURI
BOTANICAL
GARDEN

3339

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS



0

1

2

3

4

5

6

7

8

9

10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Make your additions or alterations in red
ink or pencil so that I can see them
more

Baetaculus noticed & described in connection with the
Mexican Boundary line from San Diego to the
Colorado river 1849-50

64 C C Parry.

O. Engelmanni Salm var? over Santalis

~~Spursta~~ ~~—~~ ? (Ellipsis Accs.)

10

113

Points obicular or obovate narrowing at their insertion
branching in all directions, growth principally from the
edge of the points & in the same plane. occasionally
oblique or at right angles: tubercles flatish: areolar with
their spines disposed in spiral rows crossing each other
obliquely on the plane of the points. confusedly intercrusted
on the edges; areolar prominent with ^{yellowish} ~~yellowish~~ ^{chestnut brown} wool in their
upper axils: spines (larger) ^{how many} ^(3-37?) flattened at top, widening to the
base somewhat transversely marked. light brown color,
proceeding from the lower edge of the areolar, the lower &
longer spines mostly rethorse, central & lower ones leagish,
smaller radate ones at the sides all stiff & barbed.

Flowers produced mainly on the edges of the joints, (of the median growth). Sepals in 3-4 rows; outer thick

Stemous numerous disposed in rows over the scales longer than the

Pistil thick round and bending upward - reddish style
crowned with 10 green radicle ^(upright or spreading?) partly spreading -
fruit obovate or pyriform, ^{Comparatively} deeply broadly
umbilicate, with traces ^{scar!} of the caducous flower
1 1/2 inches in diameter 2 inches long, reddish purple
when ripe & covered with greenish & bunches of slender
barbed bristles ^{barbed bristles?} ~~spines?~~ ~~or the usual barbed bristles?~~
little ~~thorned~~ ^{thorned} f?

Seeds many irregular kidney shaped with a
center & colored on white background



5

Copyright reserved



MISSOURI
BOTANICAL
GARDEN

length of spines variable say 1 to $2\frac{1}{4}$ inches — the size of the flower is considerably larger than *O. bulgarica* perhaps approaching *O. horrida* ^{2 in diam. or more}

Hab. Sides of dry hills, & plains, about San Diego, flowering through the year. Flowers larger than *O. bulgarica* yellowish tinged with red on the outside. joints 6 to 8 inches in length by 4 to 6 in breadth & about $\frac{1}{2}$ inch thick, older joints becoming ligneous weathering into reticulated woody tissue — Whole plant growing in patches 4 to 6 ft in height & covering several square feet.

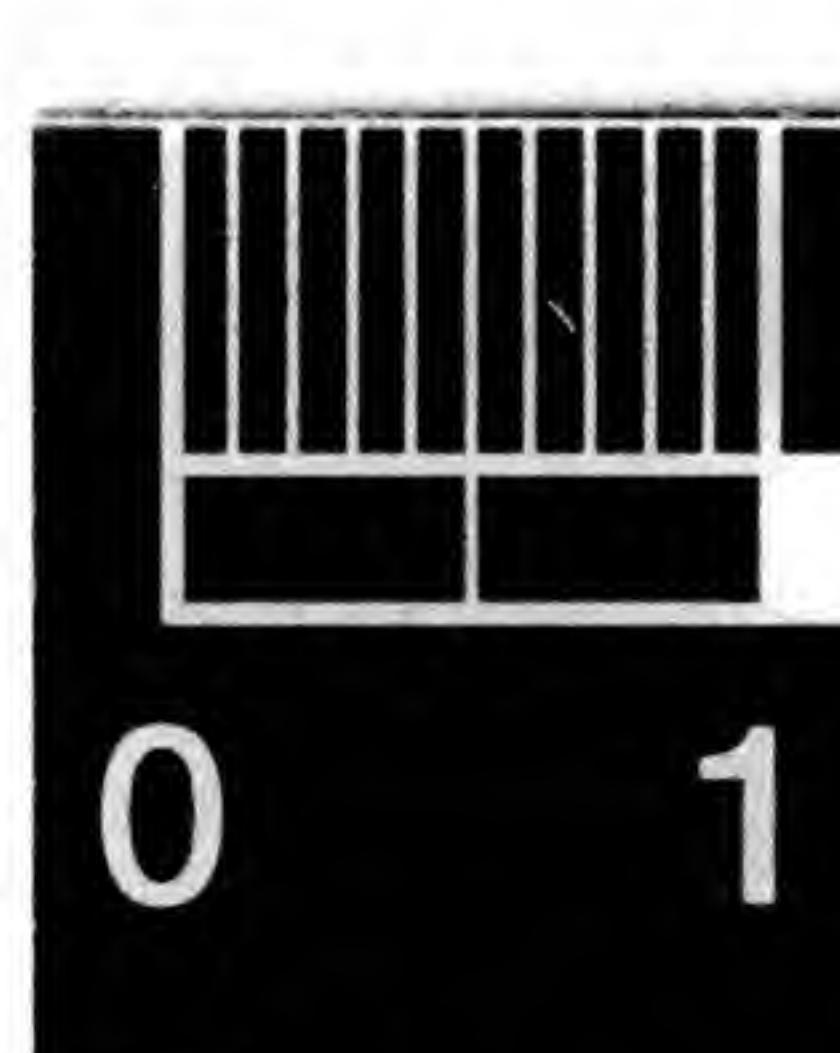
length of spines & size of flower? colour of bristles? yellowish chestnut?

2) *Opuntia* ? (elatior) cultivated at the old missions throughout Southern California called *Tuna* by the natives — resembling No 1.

Stem elliptical; joints obovate, 8 by 12-14 inches plane flattened smooth & glaucous, Areoles small arranged in parallel rows, obliquely crossing, one series of rows nearly perpendicular, the other somewhat transverse bedded with short dark brown barbed wool naked or set with spines; spines mostly 2. often 3-4. the larger & lower generally retrograde — smaller inclined to perpendicular $\frac{3}{4}$ inch long whitish & thickening at their insertion flowers set mostly on edges of the joints, outer sepals thickish — obovate, subtended by thickish awliform bracts — inner sepals obovate mostly emarginate & somewhat crenate-lacerate at top. Stamens numerous filiform outer longest generally shorter than the pistil. Pistil thick round crowded at top with 8 radiate upright stigmas. light green.

Fruit (young) oblong ovoid distinctly tuberculate, areoles subtended with awliform bracts, not spiny wool barbed; ripe fruit purple red, pyriform, plump; tubercles indistinct umbilicate at top remains of flower marked with concentric rings

Hab. growing about the adobe walls of old mission



0 1 2 3 4 5 6 7 8 9 10
cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN



length of spines variable say $\frac{1}{2}$ to 2
Flower is considerably larger than ~~the~~

Hab. Sides of Dr. Hill's & H.

Flower & fruit nature) found on the ~~same~~

plant in August

joints 6 to 8 inches in length
about $\frac{1}{2}$ inch thick, older joints
weathering into reticulated
growing in patches 4 to 6 ft.
square feet.

Length of spines \rightarrow size of flower?

? Opuntia ?

The old mission through

called Tuna by the natives

stem elliptical; joints

blunt flattened smooth &

3340



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Color of flower yellow, occasional reddish tinge, very variable in reference to spines both as to numbers & size, probably flattish & I have seen forms almost intermediate between this & *O. Tuna*, & *O. Engelmanii* established, forming impenetrable fences; erectish 10-15 ft high lower trunk thickening becoming irregular trunk-form 6 inches in diameter, joints sometimes entirely without spines - fruit edible of a pleasant sugary taste, flowering through the year sometimes 2 inches in diameter, seed irregular kidney shape with a bony margin -

This is widely near *O. Tuna* mill but is less spiny; bristles in *O. Tuna* said to be yellowish, on spines 4-6, pale yellow. Perhaps *O. Pseudotuna* later Tuna proper has red flowers but var. *humboldtii* has yellow fl. but even more spines

Col. of fl. size of spines & whether tocate or flat is not said, perhaps *O. Tuna* S. lawior Palm See Worcester pg 492 ^{Op. Tuna, India, Pak} ~~no spines only a few short~~ ³ *Opuntia* : (Cylindraceae.) ~~oracles.~~ -

O. proliferum n. sp.

Stem cylindric - Joints set with tubercles & clusters of spines disposed in oblique rows ^{5486 to 9} ~~crossing~~ each other: the main stem becoming brown smoother & ligneous.

Branches divaricatae irregularly disposed in many various sized joints, somewhat radially branched toward the summit - younger joints with prominent distinctly oblong ^B tubercles, with deep narrow intervals; barbed wool in the axils, and the branches of spines subtended by awl shaped leaves. Spines ^(how many?) ^(3 by 5/8) General, mostly perpendicular outer smaller & radicate ^{how long?} ^(See specimen of small joint sent you) reddish bracts ^{or} covered with a thin brownish sheath strongly barbed

Flowers produced principally on the upper radicate branches 1 1/2 inches in diameter - petals red, outer broad ova. inner oblong ova and forming a shallow calyx from cup crowning the ^{ovary} filament. Stamens disposed in rows filaments shorter than the pistil - Style round caped with the stigma. (Character of stigma not noted) ^{No recollection, think it was} ^{either a simple cap or obviously lobed}

Fruit ova. umbilicate set with spines ^{but not sharp} ^{or bristles?}

Green ^{color?} yellowish

tubercles?



The same year growth never produces flower & fruit - Opuntia!!
must be a mistake! (a misunderstanding of mine)

243

awl shaped leaves like the younger branches. proceeding
from the edge or near the summit of the ~~the~~^{previous} years
growth, becoming proliferous! the later part often
sprouting from the sides of the earlier and branched
together! - Seed always abortive -!

Hab. Isolated in waste places on dry hills near San Diego
or forming extensive & impassable thickets near
dried up streams. often with stem 2 to 3 inches in
diameter tree like and with singular grouped branches
growing 3 to 8 ft high - Young joints & spines
easily separating and adhering to the clothes or person
sharply barbed & painful to abstract - The main
stem like all the Cylindric Opuntia weathers
into a hollow tube forming a coarse net work of
hard ligneous fibres (see rough sketch accompanying)

(This appears Opuntia arborescens, ^{no} f. smaller than the South American tubercles of fruit not mentioned
O. arb. has yellow tuberculated fruit, red flowers 3 inches diameter - ^{of new species?} or = O. tanicata Schenck
not spines)

No 4 Opuntia - ? (Cylindraceae.)

O. serpentaria n. sp.

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS

Stem cylindric - sub-prostrate 1½ inches diameter, rows of
tubercles in spiral nearly perpendicular lines. Tubercles
prominent. the ovate with a bunch of ciliate whitish
barbed ~~hairs~~ or brushes in the axils. Areolas woolly
^{yellowish} ~~yellow~~ ^{slightly yellow} ~~down~~ ^{down} ^{yellow} spines in bunches 1 to 9 mostly disposed around the
^{length} ^{1/4 to 3/4 inch} lower circumference of the areolas. central ones
nearly perpendicular with membranous sheaths. lower
strongly reflexed, in old specimens, spine on the stem.
Stem divaricately but sparingly branched.

Flower not seen.

Fruit ^{yellowish brown} ~~dry~~ ⁺ saucer shaped. very deeply & broadly
umbellated. remains of flowers rather permanent.
^{is the flower fruit, thickly set with spines and long ciliate wool.}
^{or the fruit} ^{spine} ^{deeply} ^{umbellated} ^{produced} ^{the} ³ ^{years} ^{growth}.



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Seeds large, whitish, bony, uneven, or beaded, & thickened.
Hab. Dry hill sides - allied to *O. No 3.* but maintaining

size of branches - destruction? probably never may do California ^{now} May 1877
but that has 3 species only. — Apparently never

Fig. 2 Reticulata like O. amboinensis

20. *Hedysarum* *hirsutum*
39. *Thlaspi* *arvense*
38. *Thlaspi* *arvense*

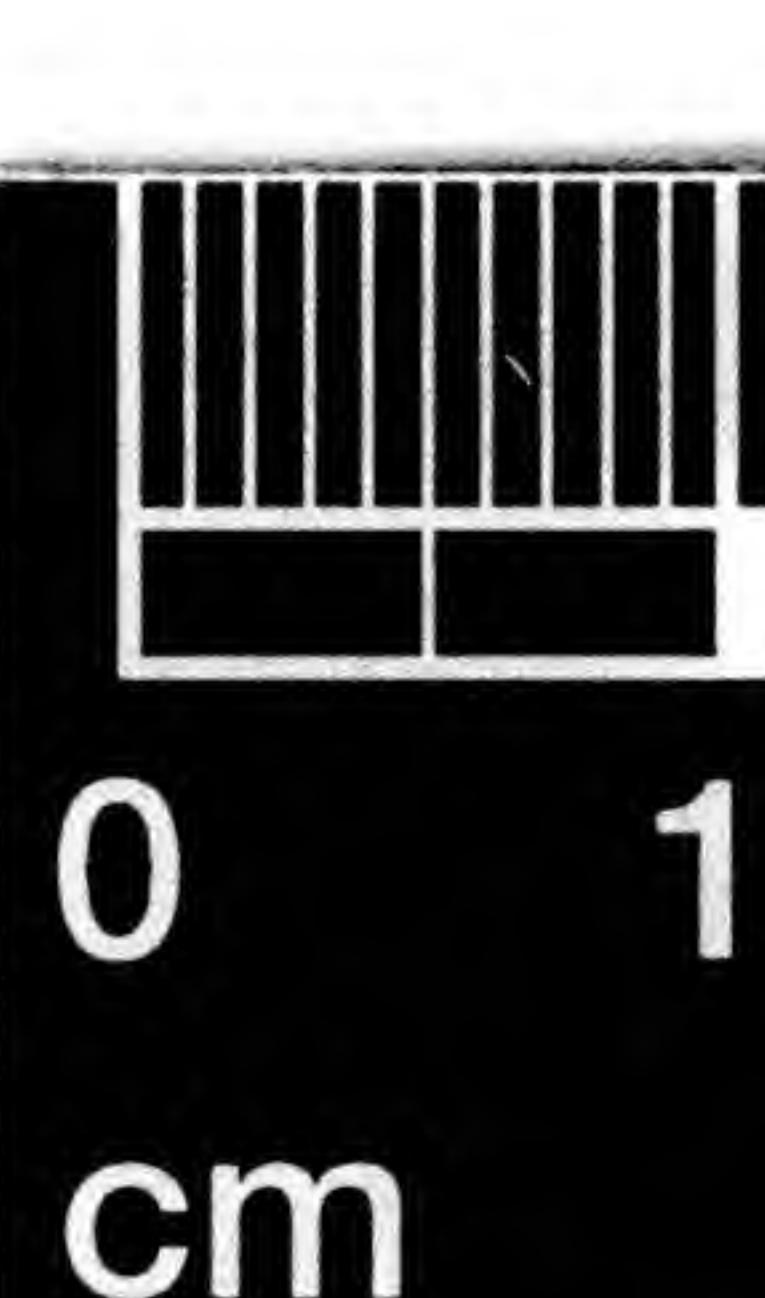
No 3 Phu Tha ramosissima n.p.

Plant cylindric divaricately branched, joints slender
cylindric, primary trunk $\frac{3}{4}$ inch in diameter. Secondary
 $\frac{1}{2}$ inch. - 3 to 8 in. long. thickly branched and set
with long spines interlocking. Tubercles oblong,
irregular iamond shaped large for the size of the
plant. ($\frac{1}{2}$ to $\frac{1}{4}$ inch in length -) slightly prominent,
regularly spirally disposed in 4 to 6 rows. Areolas linear
shaped, occupying the upper part of the tubercles, woolly
in the axils, with one long needle shaped spine,
projecting from its lower part. Spines 1. to each
areola $\frac{1}{8}$ inch long with occasional small radicle
ones round its base. the long needle shaped spines
are finely barbed and sheathed in a thin whitish
membranous envelope. (spines) thickened at their
insertion purple in the center and somewhat
transversely marked; sheath oblong sacculated entirely
enveloping the spines easily separating at base,
whitish below yellow above

Flower not seen.

Flower not seen.
Dead brownish specimen seen by me were note
down. Frukt ^{oblong} ~~oblong~~ ^{Pyriform} $\frac{1}{2}$ inch long less than $\frac{1}{4}$ inch
~~oblong~~ ^{oblong} ~~oblong~~ ^{Pyriform} $\frac{1}{2}$ inch long less than $\frac{1}{4}$ inch
broad, thickly covered with small ^x tubercles, with
^{what means here - compare with those on the main stem} ~~bristles~~ ^{bristles} ~~wool~~ and slender slender ^{slender} spines, $\frac{1}{4}$ inch long
remain?

Remains of the flower pressed in small dry
scales crowning the top of the fruit.
From the summit of the ~~whorl~~^{lates} growth
when matured and dry

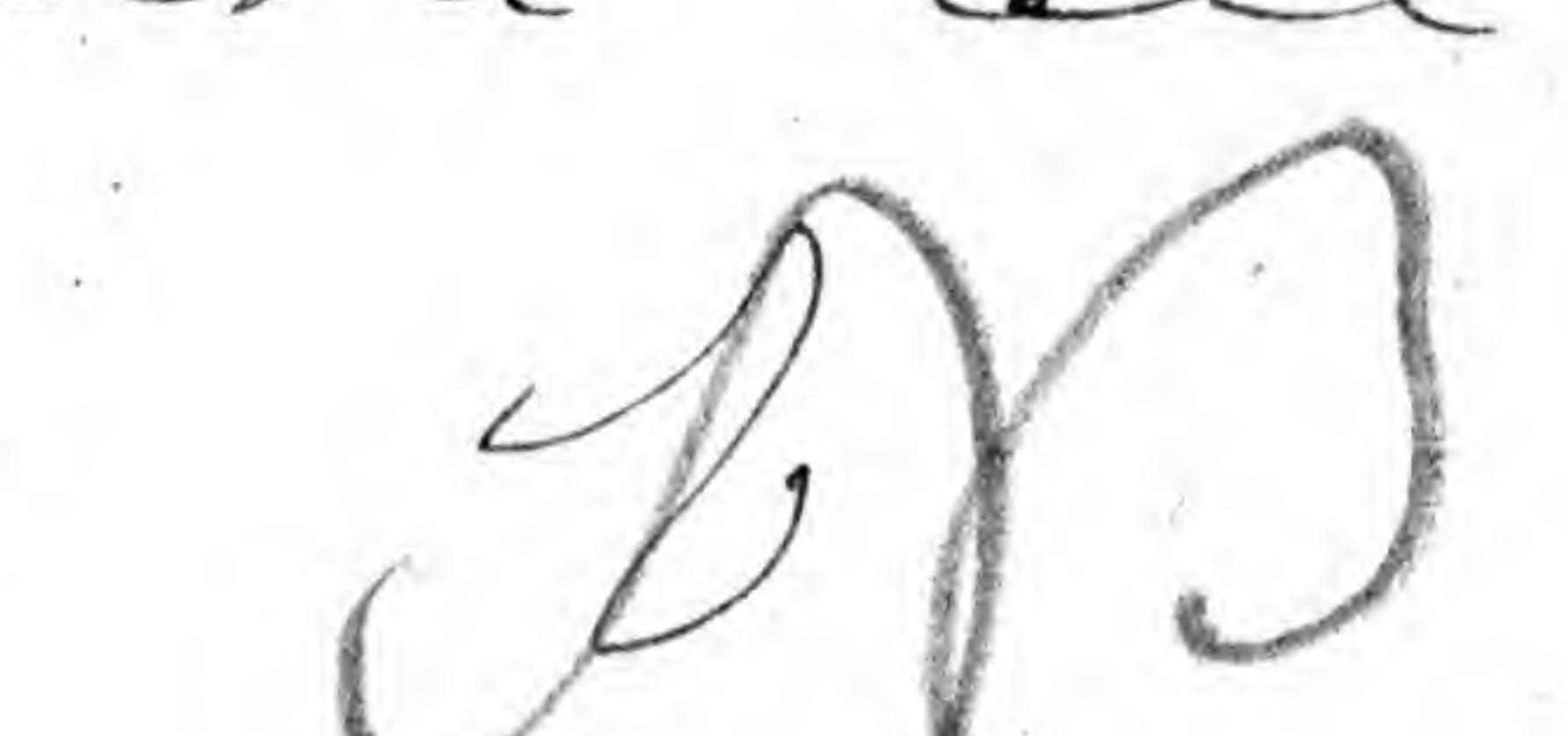


Copyright reserved





MISSOURI BOTANICAL GARDEN

Seed few. 4-5. often abortive, irregular orbicular white bony with a pubescent? margin ~~red~~ ^{but} Hab. Growing in dry gravelly soil. near the river Colorado. & Desert. Its densely crowded spines give it a formidable look. bushy about 2 ft high and spreading. younger joints covered with a mealy bloom. Main stem ligneous, weathering like all the Cylindric *Opuntia*, to a dissected cylinder  wooded reticulated fibres.

more fully describe the former - decidedly new - approaches the *gracilis* but its intervariegated joints and spines are distinctive.

No 6 *Opuntia Parryi* n.sp.?

Stem cylindric pointed. joints 4 to 8 inches long, 1 inch in diameter. : Tuberules oblong $\frac{1}{2}$ to 1 inch long, tapering at base, spines at the apex with short brownish wool in the axils. spirally disposed. Spines small ^{harmless?} central, (largest) pointing downward $\frac{1}{4}$ inch long whitish, ^{sheathed} ^{or flat} flower greenish yellow $1\frac{1}{2}$ inch in diameter. Sepals ^{flat or upright} outer) small bract form, acuminate, (inner) petaloid. obovate acuminate. Stamens numerous shorter than the style. Style cylindric nearly as long as the petals green with radiate signals at summit. Fruit orbicular? oblong, broadly umbilicate by the ^{bulky} ^{falling} of the flower. clothed with slender spines, ^{bulky} radiately disposed near the summit of the previous? growth Hab. Hills & plains about San Felipe. eastern slope of Cordilleras. - Prostrate & ascending forming patches 2 to 3 ft in diameter.

Note !

Number & shape of spines & whether sheathed angled or flattened?

No note of the exact number of spines probably 3 to 8 central and a larger variable number of radiate ones. probably certainly angled, not rounded



0
cm

1

2

3

4

5

6

7

8

9

10

copyright reserved



MISSOURI
BOTANICAL
GARDEN

7

1 *Echinocactus viridescens* (Nutt)

Plant globose flattened at base. Ribs vertical strongly marked with deep furrows. ordinary number in full grown specimens 21. Tuberules slightly swelling from the main ribs $\frac{1}{2}$ inch long with woolly ^{areole} axils and bunches of spreading spines occupying the lower portion of the ovate areole.

Top depressed woolly uniting the areoles of the ^{uniting} ^{extreme} ^{upper branches of} the century spines in a confused mass.

Spines diverging, curved with convexity upward.

^{how long?} 18-20 bedded in the woolly areoles. 4 central,

^{4 to $\frac{3}{4}$ inch} 4 larger, diverging at right angles with each other. 2 largest perpendicular flattened at top widening by their insertion transversely marked, very stiff greenish tinged with red. 1\frac{1}{2} inch long, transverse ones more rounded shorter annulately marked; exterior smaller spines disposed in a radiate manner, all more or less curved ^{never hooked} ^{never hooked}.

Flowers circularly disposed in the axils of the upper spines persistent and adhering to the fruit. ^{more like "linear lanceolate"} External scales oblong ovate inserted by a thickened claw in the fleshy disc surrounding the stamens crenate acute at summit exterior gradually becoming smaller to form the close acute scales of the fruit.

Stamens numerous the external longest, all inclined towards the upright stigma inserted on the white internal disc sloping on all sides to the base of the style.

Pistil cylindric smaller at base the upper part more than half way divided into 12 linear upright bundles of stigmata which yellow.



0
cm

1

2

3

4

5

6

7

8

9

10

copyright reserved



MISSOURI
BOTANICAL
GARDEN

color? Nuttall says: yellowish green, ^{right}

Size of flower $\frac{1}{4}$ diameter, $1\frac{1}{2}$ inches long including the ovary; length of style 1 inch. Stamens shorter than the petals or stigmas. The latter slightly shorter than the petals. —

Fruit ^{bulky with a thick skin, intensely sour, closely resembling a gooseberry} globular or gooseberry shaped of a bluish green color $\frac{3}{4}$ inch in diameter, covered with ^{covered by the flower, see above} ^{calyx, see specimen} adhering lunate shaped scales. — The mature fruit separating from its attachment leaving an aperture at base for the escape of the seeds. Seeds small black shining. (Plotted ² see specimen) kidney shaped, its contour varied with flattened planes. Hab. Dry hills & ridges. San Diego — Medium size 6 inch diameter 4 inches high. I measured one, which grew in spot overrun with fire 4 ft high? It was half prostate. & an abnormal growth long. & 4 ft in circumference. — When wounded or burned over by fire, the roots develop separate heads, forming in favorable situations a large pile of prickly balls.

Nuttall specimen was above the medium size. The lowest central spine always the largest near E. Texas (but to differ); now plenty over of Mayo, (this is one of the giants) no doubt Nuttall, plant, though his is a foot high & of 10 inch diameter are the internal spines equal, or also the lowest longer.

? *Echinocactus cylindraceus* var. of *E. undulatus*

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS

Stem cylindric, in young state globase, largest about the center rounding at top; ribs vertical or somewhat spiral in ^{now many in usual specimens, from 13 up to 25 to 29} large specimens ^{see specimen} 25 to 29 rows ^{see specimen} intervall angular rich wide at top; tubercles blunt flattened horizontally, leaving spines at the apex, ^{vertex} short wooly. Spines in close spreading bunches, lower central one longest, 2 inch, slender hooked? curved towards the apex, flattened horizontally, and marked with lined rings, white in the younger ones pink about the center, fruit in the axis of the upper spines crowded in the apex of with the confused spines of approximating ribs, axis of insertion of fruit very wooly



0
cm

1

2

3

4

5

6

7

8

9

10

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Notes & questions for Dr. Gray

Echinocactus viridescens number of all

spines or only of the radial ones (18-20+) only radial & central besides
with small specimen send I

find 9 rad & 4 central sp.

Cek cylindraceus has 12-17 rad
& 4 central spines in the young species

Specimen sent. Fair average
as to number of radulae spines
sent by you -- fruit found in June 1850.

E. virid. Time of flowering? -- Feb. & March. fruit succeeding
when were spines collected? near San Diego. abundant.

No spec of larger species? none in my possession -

fruit edible? pulpy? Sour. but juicy when fresh. resembling
a half ripe gooseberry in taste

Please give the date of collecting
the different species, time
of flowering, time when notes
were made.

notes made on all the Californian
cacti near the coast in August
1848. (add some notes supplied.)

Opuntia occidentalis orbicular more oval than orbicular
plants?

time of flowering? from May to Aug..

O. prolifera seems near. very distinct, but belonging to the
O. Bigelowii, but tubercles same section. I noticed the O. Bigelowii
of joints seem very different, on the Gila. Spring of 1852. no notes made or
also locality. -- The intervals between tubercles are not deep
but very shallow

& narrow

& wide

Date of flowering? flower collected in August.

O. serpentaria dry hillsides

— where? Near San Diego. more isolated in habit than O. prolifera

Remarkable analogy of
Castus forms east & west of
the California Mts.

Echinocactus viridescens to cylindraceus.

Opuntia prolifera & Bigelowii somewhat different in habit
O. serpentaria & Echinocactus quite distinct.



0
cm

1

2

3

4

5

6

7

8

9

10

copyright reserved



MISSOURI
BOTANICAL
GARDEN

general habit. *O. serpentinum* is subprostrate, sparingly branched.

frt yellowish brown, with spines & wool

O. cehuana is erect, branches shorter, very numerous, thinner; frt lighter colored but apparently similar in shape without wool. It is remarkable that in both the fl. is "rather persistent"

How is the wood?

O. ramosissimum branches are varicose (in right angles to the stem?)

what does "interlocking" mean?

tubercles $\frac{1}{2}$ - $\frac{1}{4}$ inch long
shape of Areolas, of tubercles & spine appear to indicate the identity of *O. B. B.* & *O. B. P.* plants and especially the only remains of flower.

I have seen young wood of *O. pectinatum* similar to wood. solid. notes of reticulation refer to young branches



as if split down, not knotted at summit?

Wood not noticed. according to recollection the stems are fleshy & leave no woody stems.

O. Parryi radiate straight (not "capped"?) all obovate more long frt obovate or clavate

How is wood?



cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

0 1 2 3 4 5 6 7 8 9 10



1.25 in. long 2
 ciliate along the edge, with fine setae -
 oblong yellow scales la.
 of fruit light greenish
 Measurements of ~~base~~
 2 ft 10 in. circumfer.
 Hab. Dry rocky Cañon
 California Mountains. Eastern
 appears to differ from *D. viscidissima* only by the
 No 1 Glauca. ^{*Eryngium*} ~~*Glaucum*~~
 Nuttall's *Carex californicus* is probably one of the
 "flower small yellow" I am quite at a loss.
 Stem general outline even,
 perpendicularly ribbed.
 tubercles
 grooves, linear somewhat
 Areolae. on the upper part
 brownish short wool -
 spread over the whole surf.

3345



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

D'Leconte has remarked this *Cactus* east of San Felipe. Notes made on the spot: 3 feet high, $1\frac{1}{2}$ in diameter, 27 ribs, spines mostly hamate, sometimes several plants from a single base.

Echinocactus *obtus.* No 2 continued

4 inner spines the largest, the three upper pointing upwards & sideways. surrounded by ^{how many? see specimen} smaller rays & each ^{circumference?} first one inch long $2\frac{1}{2}$ inch diacanthus, scales semilunate woolly - obtuse close to the fruit. Remains of flower persistent, consisting of oblong yellow scales largest in the center. Color of fruit light greenish & pulpy ^{tips} ~~lost~~. Measurements of ~~large~~ specimen: height, 2 ft 10 in., circumference 3 ft.

Hab. Dry rocky Cañons near San Felipe, in the California Mountains. Eastern slope.

appears to differ from *D. viridissimus* only by the cylindric shape - it ^{is} ~~is~~ ^{to be named} *Echinocactus*.

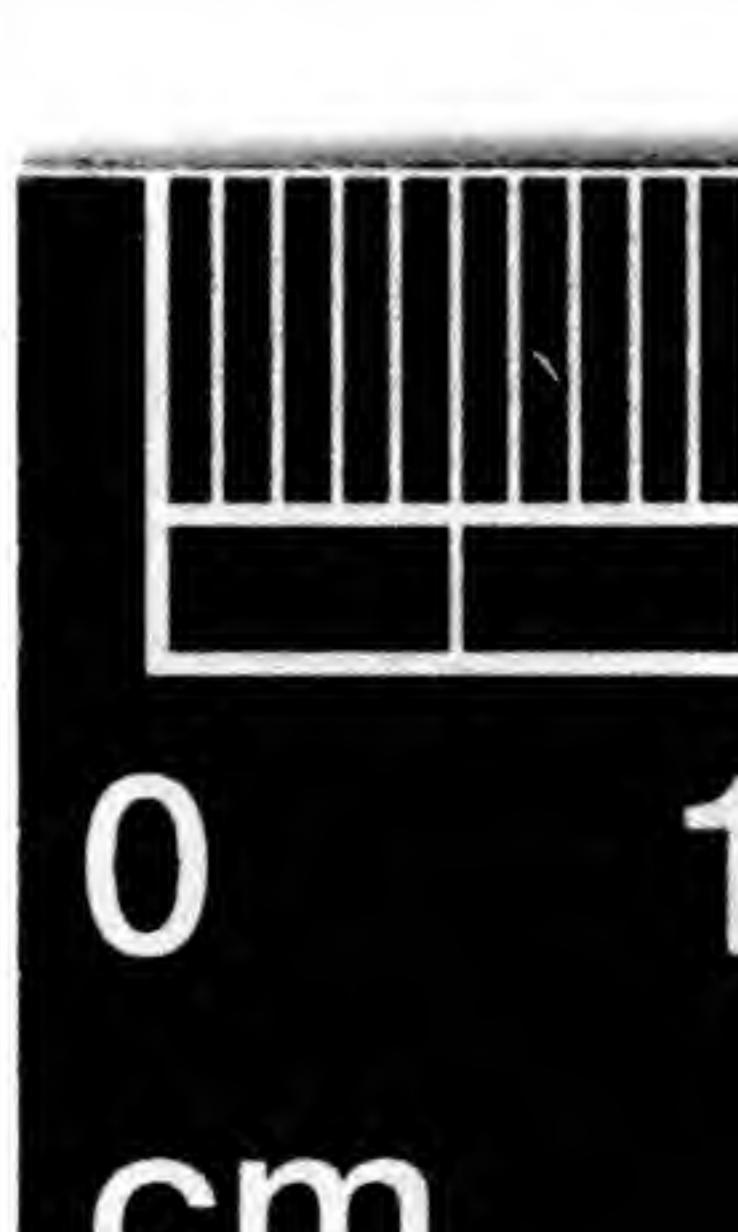
No 1 *Cereus* ^{Emoryi} ^{ssp?} *californicus* (W.H.)

^{Not this Cereus californicus, is probably one of the cylindric Opuntiae, perhaps No. 5, or 4}
"Flower small yellow" I am quite at a loss to refer this.
Stem general outline evenly cylindric $1\frac{1}{2}$ inches diameter perpendicularly ribbed. Rebs 15. separated by sharp ^{rebeccated} grooves, in each somewhat swelling at the summit areolas, on the upper part round & bedded with brownish short wool - Bunches of spines. Thickly spread over the whole surface interlocking and hiding the ribs. Central spine much the longest, at right angles to the stem or inclining somewhat upwards 2 inches long, needle shaped, not barbed, little whitish green. External (radicate) spines smaller acicular spreading in all directions numerous 40 to 50. Areolas & spines at summit of stem crowded into a dense mass.

Flower not seen. Its remains crowning the fruit.

Fruit globular, disposed irregularly on the sides or near the summit of ~~the stem~~ ^{improbable!} *Growth* solitary or several together, thickly clothed with areolas & spines except in its lower part, resembling a portion of the main stem $1\frac{1}{2}$ inch diameter. ^{Does the fruit or the lower part resemble the main stem?}

Seeds numerous, black, middle sized.



cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Hab. Dry hills near the sea, joints 6 to 8 inches with the main stem prostrate ascending. 2 to 3 ft long, growth central with occasional sets.

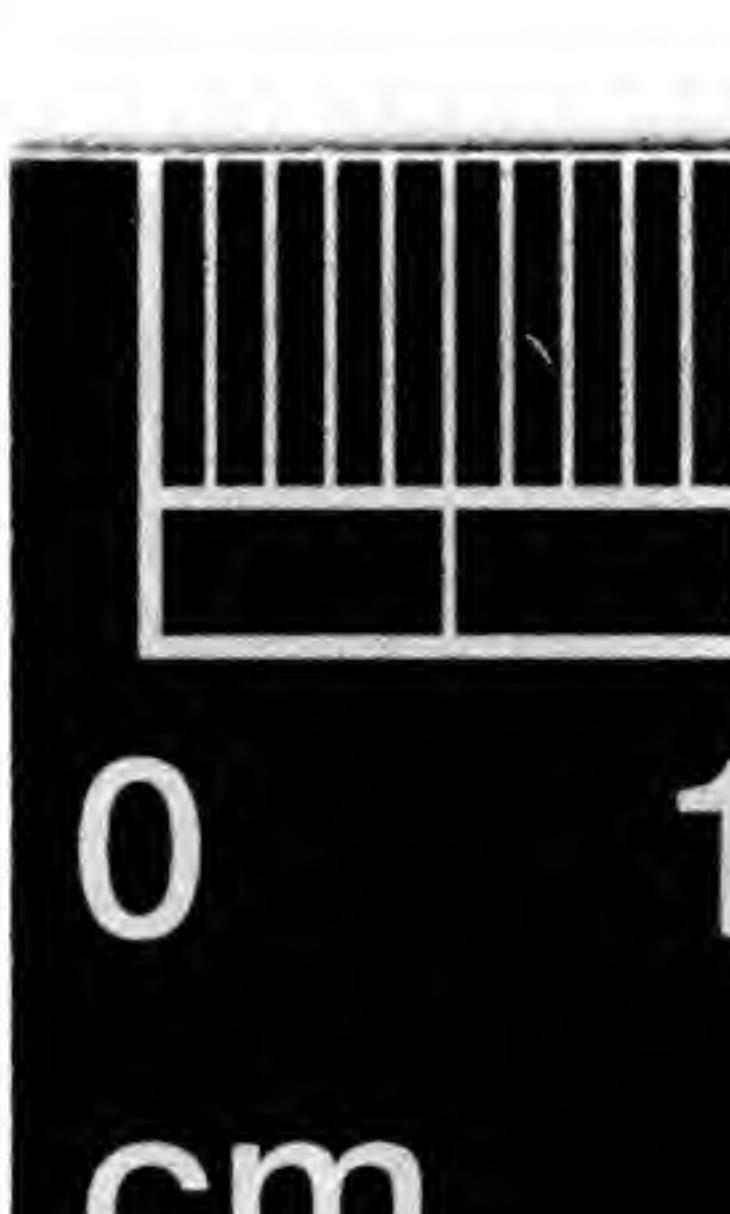
Growing in thick masses, covering 10 to 20 square feet. When old the spines separate in a body from the stem leaving dry hollow woody fibres. — I hardly think this can be Nutt. *C. Californicus*. It is not common, and does not even agree to his meagre description. It is the only *Cereus*, to my knowledge growing on the Pacific side of the mountains.

Cereus Engelmanni Parry var.
No 2 *Cereus - in sp. P. Engelmanni var.*

Stem cylindric 6 to 12 inches several stems proceeding irregularly from the same root 2 to $2\frac{1}{2}$ inch diameter. Ribs perpendicular about 13.

Tubercles irregularly rounded, in intervals ^{between the tubercles on the same} ~~in or between two ribs~~ shallow. Areolas, woolly with short wool, especially on the newer part of the stem. Spines immersed in the areolas, composed of 4 longer central ones, ^{straight} surrounded by (8 to 12) ^{how many} smaller rays, the lower central spine the largest projecting downwards 1 $\frac{1}{2}$ inch, the three others projecting ~~downwards~~ upward & to each side.

Fluit in the axils of the upper spines, few and irregularly distributed, (projecting about 1 or 2 inches from top of the stem, —) oblique oblong, 1 to 2 inches long with an additional inch for the dried remains of the apparently pink flower. 1-1 $\frac{1}{2}$ inch Diameter, covered with smaller spines & areolas. Spuriously disposed. Spurse at base & crowded into a confused spinous ring around the sepals — Pipe fruit yellowish pink composed of a thin skin, covering an interior seedey pulp. (seeds black & pulp pink or white, of a see specimen sent A.)



0 1 2 3 4 5 6 7 8 9 10

copyright reserved



MISSOURI
BOTANICAL
GARDEN

inch. the three others
and 1 1/2

near summit of axis

size of fruit from direct measurement
before correct

about 1 or 2 inches

oblique oblong. 1 to 2 inches

inch for the dried remains

lower. 1-1/2 inch diameter.

2 areolas. Spinally disposed.

into a confused spinous ring

the fruit yellowish pink

covering an inner seed

pink or white. of a



MISSOURI
BOTANICAL
GARDEN

copyright reserved



her
inch

3346



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

sub subglobose slightly compressed, ovate in lower part of back, irregularly verrucose, tubercles running into one another, so as to form irregular pits between them, appearing rugose, very lucious melting taste.

Hab. Dry Mountains about San Felipe
Spines white younger ones brown at base, needle
shaped not barbed. general color pale green
grows in clumps 6 to 12 inches high - how many
variable in number say 3 to 12. in scattered ^{clumps} generally together?

* In all main, the tubercles are disposed in spiral rows
one set of rows is more conspicuous & deserves to be counted, in smaller ones 5 or 8 in
large ones 13 or 21 rows *Mamilaria* (*Tetraenobtus* n. sp.)

phellosperma n. *hypothysperma*

Plant short cylindrical to globose. 3 to 5 inch long
1 to 2 $\frac{1}{2}$ inch in diameter. Tubercles somewhat
cylindrical $\frac{1}{8}$ inch long disposed spirally in parallel
rows crossing each other obliquely with their
radiating spines interlocking and ^(the m. good this) entirely covering
the plant. Spines crowning the summit of the
tubercles ^{how many 15 to 25.} outer many, radiate, straight acute, white,
($\frac{1}{8}$ inch long) variable in length, inner spines ⁴
arranged in form of a square projecting at an
angle of about 45° from main stem, hooked and
sharp at the extremity, $\frac{3}{4}$ inch long, reddish purple

Flower with the sepals imbricate, outer shorter
inner lanceolate acuminate yellowish with a
pink midrib. Flower obconic $\frac{1}{2}$ to $\frac{3}{4}$ inch, long
 $\frac{1}{2}$ inch diameter, growing immersed in the upper
spines - Stamens numerous. filaments filiform
anthers small yellow shorter than the Corolla. Pistil
linear stigmas 3 lobed at summit greenish exceeding
the stamens. a little shorter than the Corolla.

Found in the axis of the upper sharp tubercles
crowded when immature with the remains of the
flower. concealed beneath the radiating bunches of
spines: obcircular to pyriform. a small deep umbilicus
at top after the flower has fallen. at maturity
you will no doubt decide from this sp. that two species are included
in the above description. The flower of the first species is unknown to me & with
this difference the description was all taken from the first specimen & will apply to



0
cm

1

2

3

4

5

6

7

8

9

10

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Dr. Amy writes, Biggs, Texas Nov 26 1852: The Man. of San Diego has according to my dictation
described recently a hooked cactus spine - probably about 12 in. long.

the fruit pushes out beyond the bunches of spines
becomes from green of a light scarlet ~~scarlet~~
color increasing to 1 inch in length, smooth with
the seeds appearing through the thin juicy envelope
about 1/2 inch diameter.

Seeds large for the capsule, immersed in thin
watery pulp with conspicuous white threads
attached to the hilum. Seeds irregular consisting
of a lower brown portion to which the hilum
is attached resembling a chalaza, and a large black
wrinkled portion containing the Cotyledons.
Le Conte brought seeds exactly corresponding!

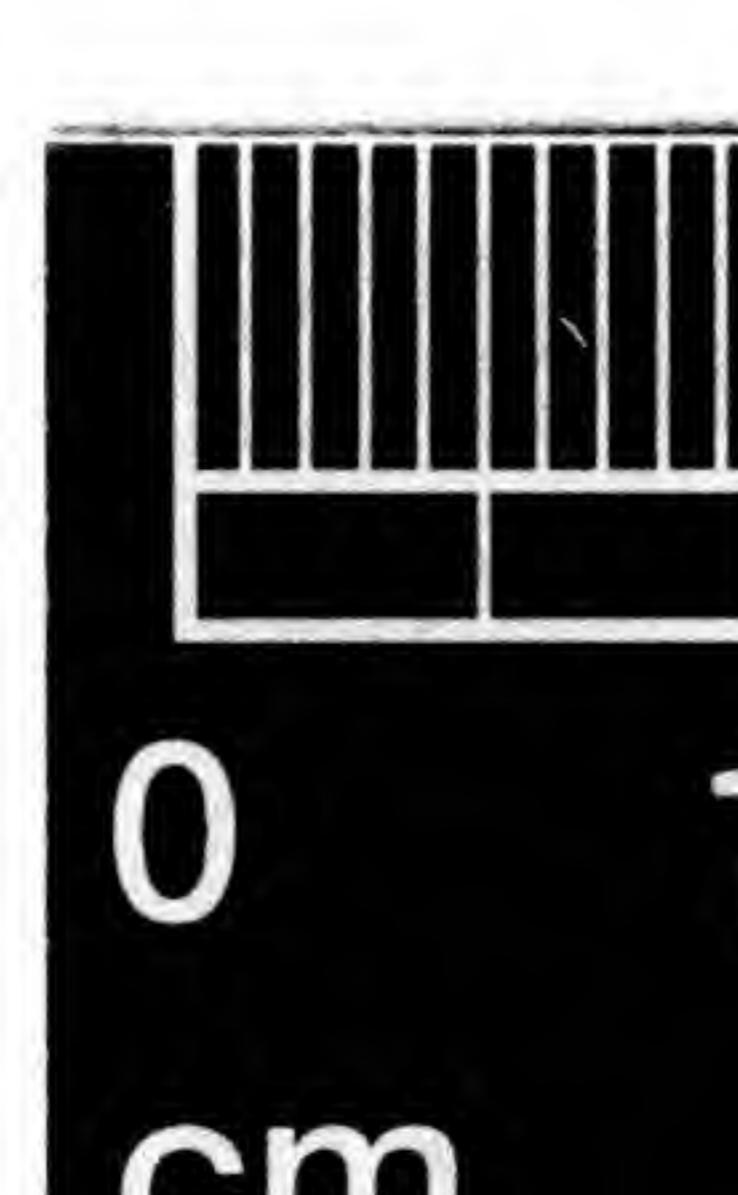
Nat. Dry gravelly hills about the base of
bare mountains east of Cordilleras. Junctions of
Gila & Colorado rivers. (also applies to the flower only)
San Diego. Varying much in size.

Texture of the plant consisting of the external
cellular portion of which the tubercles are composed
and an internal soft fibrous woody matter sending
out threads to each tubercle. The whole
plant in decay withers up into a shrivelled mass.

perhaps the California. M. Goodrichii Scherzer but that has only the crown of the
4 central spines hooked and shorter & longer than the 3 others, radial spines 12
tubercles very small, almost angular compressed, and hidden by the numerous spines

P.S. I did not go far enough east up the Gila to meet
with the giant Cactus, Cereus. There are other species
of Opuntia on the eastern side of the mountains
one with elliptical joints & pink colored flowers,
the other cylindric. and thickly set with coarse
spines -

Dr. Le Conte has collected seeds of what he calls E. W. L. in the Gila
but the seeds differ much from all seeds received from Le Conte. He describes it as a large
ovate plant with one hooked spine in each bunch, & numerous oblong yellow
fruits. - The seed is much smaller & pitted. - Perhaps all the E. W. L. seen there
by Emory 1846 & by Wright belong to this ^{new} species. What is your
experience? or opinion? My seeds have germinated
I took no note of any difference between the Gila Opuntia, M. Goodrichii & the ^{new} species



copyright reserved

MISSOURI
BOTANICAL
GARDEN

Cactaceae of S. Jones, and Whipple with
with full notes by Dr C

G. *Mammillaria* (Coryphantha) near Scheeri but apparently
different - probably *M. Arizonica*

K. *Cereus phoenicurus*

F. *C. Zygocactus*

L. *C. conothelos*

B. *Opuntia phaeacantha* major

A. *O. chlorotica* (or near *chrysotricha*?)

C. *O. -* (Platoptis) } belong together.

E. *O. -* " } belong together.

I & J. *O. -* " } belong to the last 3.

D. *O. whipplei*

H. *O. -* " var. }



0
cm

1 2 3 4 5 6 7 8 9 10

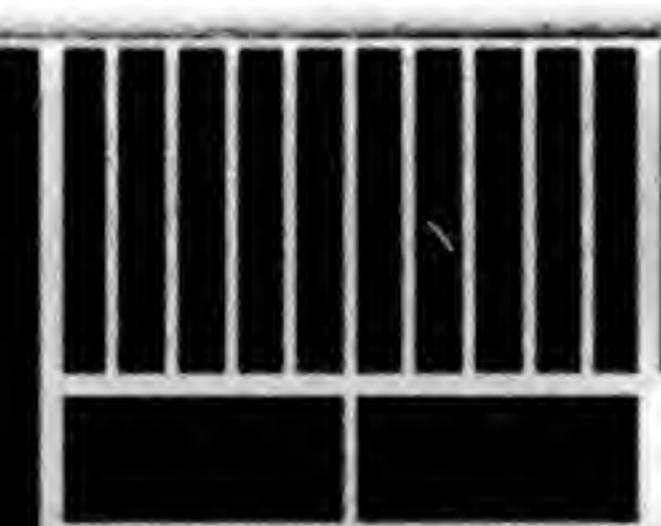
copyright reserved



MISSOURI
BOTANICAL
GARDEN

3348

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS



0 1 2 3 4 5 6 7 8 9 10
cm

copyright reserved



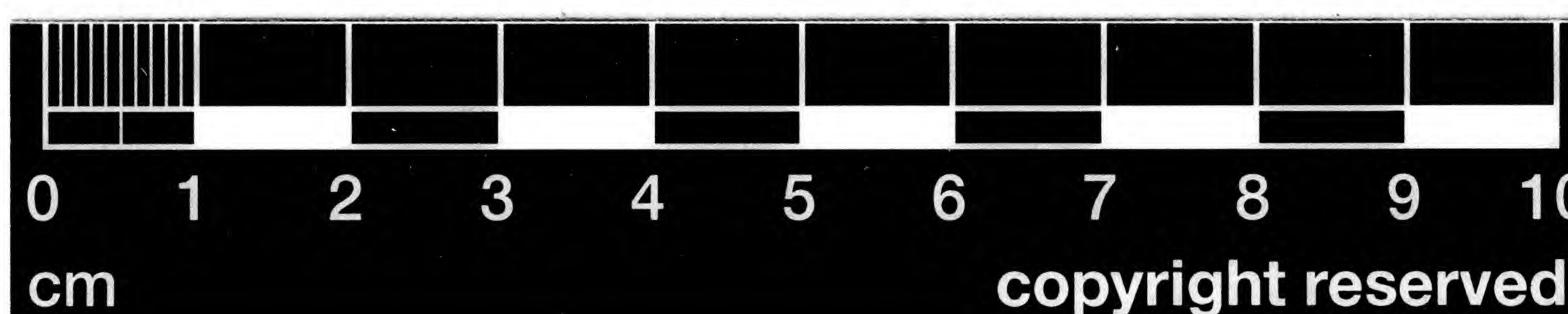
MISSOURI
BOTANICAL
GARDEN

"right's" *Caclaceal* 1857 & 1852

- ✓ 41 *Cereus* Storm hills on the Rio Grande Ribs 8-12 (Stam. 600) light purple stripes yellowish green
- ✓ 88 *Echinocactus* ^{uncinatus} Storm hills near Frontera 2-6 in high 3 ft tree Fl. carmine red March 21
- ✓ 86 " " " " March 31
- ✓ 94 *Mammillaria hemisphaerica* Storm hills near the Rio Grande
- ✓ 95 *Cereus* " " " " (mostly branching, Fl. yellowish-green Ap 2
- ✓ 282 *Opuntia* Rocky ravines near Frontera Fl. yellow reddish within at Frontera simple or " " " "
- ✓ 218 *Echinocactus* ^{catenatus} Storm hills " " " " purple May 4
- ✓ 169 *Cereus* Sand-hills between Cimiedique Spring & the Salado (Chihuahua) (purple branches few) Fl. " " Ap 27
- ✓ 167 " Valley beyond the Salado toward L. Santa Maria (Chihuahua) Fl. " " 18
- ✓ 168 " hills ^{dasycanthus} " " " " Chihuahua " " 19
- ✓ 205 " hills around Frontera Among stones & rocks Fl. yellow " " " "
- ✓ 228 " Sandy hills near Camp Gilmore ^{Expt.} Fl. purple " 24
- ✓ 329 *Opuntia* Mts. near El Paso " " " " " " 27

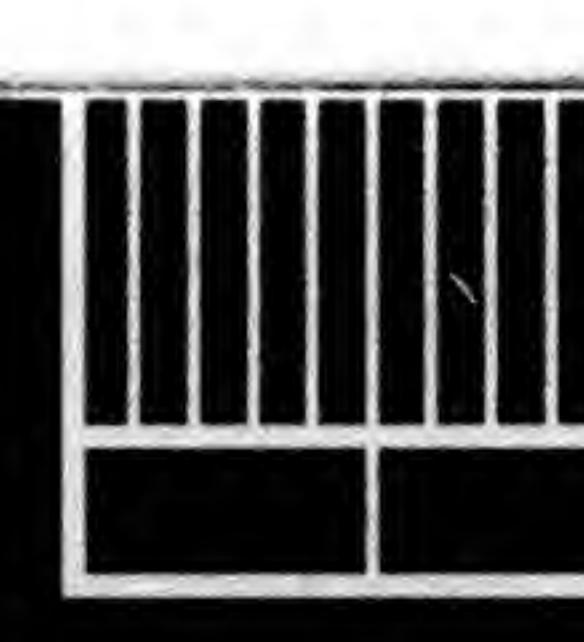
Aug 17

- N 416 *Mammillaria* Prairies from the Rio Grande to Eagle Springs and along the Llano 21
 337 Hunting 191 R. G. caespitose
 421 " ^{vaginigera} Hills near Eagle Springs 2°-3° high much branched & spreading " June 21
 410 Cerren San-hills of the R. G. densely caespitose " 19
 478 *Mammillaria* In prairies at the head of the Limpio Simple " 25
 573 Cerren ^{Stony} *Greggii* ^{Wrightii} ^{var.} ballies between the Limpio & ojo de Leon " 27
 490 *Opuntia* Mountain sides on the Limpio & same color as those of *O. arboreosetosa* 26
 538 *Echinocactus* ^{flexispinus} Rocky ledges from the Limpio to the San Felipe on foot high 8' in " 30
 diameters
 478 *Opuntia* ^{Engelmanni?} Bank of atorreras between Rock-breck & the Limpio " 15
 311 " ^{fragilis} Sandy ridges at Frontene May 15
 832 " ^{phaeacantha?} On sandy hillocks betw El Paso " 19
 0 *Mammillaria* *macrocarpa* Valley near Crook creek, July 3rd July 3
 121 *M. macrocarpa* " 1852
 0 *M. tuberosa* Monte sides Near El Paso 1852
 2 *Opuntia* in flower Sandy ridges Rio Grande June 17
 0 *O. arboreosetosa* Limpio
 0 *O. phaeacantha* Limpio May 11



MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS



0

Copyright reserved



MISSOURI
BOTANICAL
GARDEN

Opuntia Palmer 1867

80 (89) fl. fr. *Opuntia*
81 (93) fl. fr. *Opuntia*
82 (95) fl. fr. " "
83 (92) } fl. seed of *O. acanthocarpa*
84 (87) } yellow fl.
85 (94)
86 (90) fl. spars palea
87 (86) fl. fr.
88 (103) living plant, white fl. fl. large
89 no plant, seed marked 600 *Cylindropuntia* Hawke
90 (104) } living plant
91 (105) } seeds in capsule; green flesh fr.
92 (100) } very small flowers
93 (98) *Opuntia* few seed off
600 (600)
(900) *Opuntia* fl. magenta, rubish
several vegetative organs



0 1 2 3 4 5 6 7 8 9 10
cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

3350

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

N88.6

Camp Grant, Northern Arizona 1867

Opuntia (Cylindropuntia)

found May 15 on a ~~squat~~ in flower & fruit.
 Seen on ~~the~~ end of an older (apparently postulate)
 branch, ~~width~~ $1\frac{1}{2}$ in. diameter; tubercles crowded $\frac{8}{13}$
 abt 6" long, oval, spines numerous (15-20) short (4-6 l)
 sheath stellate -

abt 7 branches from top of this stem 3-6 in. long
 11-12 in. diameter, tubercles a little smaller, abt $\frac{8}{13}$
 spines 12-15, 3-6 l long.

fl. two inch diam, "light pink", ovary $\frac{7}{11} \frac{8}{13} \text{ or } \frac{9}{15}$ in. long.
 20-35 anthers, covered with light brown wool and bearing
 yellow bunches of bristles at upper edge.

segs. abt 13, petals abt 13, stellate; 8 rose-colored
 cretish stigmas -
 berry $6\frac{1}{2}$ in. long, about oval, tubercled, yellowish
 green now (February) rather dry but not hard, much like that of

over



0 1 2 3 4 5 6 7 8 9 10
 cm

copyright reserved



MISSOURI
 BOTANICAL
 GARDEN

Eugen^E L. Massot,

DISPENSER OF

P U R E M E D I C I N E S ,

THE FINER CHEMICALS,

AND RELIABLE PHARMACEUTICAL PREPARATIONS,

CORNER OF FOURTH AND SPRUCE STREETS,

ST. LOUIS, MO.

also allied to *O. Whipple*
but seed different, also, apparently
fruit

O. arborea ? but very different in shape
with very deep umbilication.
seed large, flat, regular, almost oval and
2 - 2 $\frac{1}{4}$ in. in diameter, with a broad
but rather indistinct concentric



frt
MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

105
104

102 long pet.
S. v. 1, light pink
in flower 8.00

100 det.
dicta

98 ~~fructosa~~

8.00. fruit ~~flor~~
& flower

86 another diff.

87 ~~same~~
(22 Carter for
Quinton

6.00 dwarf Carter

92 another diff

90 ~~or~~ other diff

93 long flat
with fruit.

95 ~~or~~ 7.

94 in the box

100 undiff
pink flowers - 16



0 1 2 3 4 5 6 7 8 9 10
cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

3352

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS



0 1 2 3 4 5 6 7 8 9 10

cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

Carus Regelmannii var variegatus (a flower doubtfully
belonging here)

C. cordatus

C. fentoni (with flower) " many forms.

Phoenix (with flower) bunch ball Cactus

Echinocactus Lecontei " (flower)

Opuntia phaeacantha ? (flower)

and other flowers, with it is impossible to identify

Whipplei

~~acanthocarpa~~

~~basilaris~~

Cactus & Palms 1868



0 1 2 3 4 5 6 7 8 9 10
cm

copyright reserved



MISSOURI
BOTANICAL
GARDEN

3353

MISSOURI BOTANICAL GARDEN
GEORGE ENGELMANN PAPERS



0
cm

1 2 3 4 5 6 7 8 9 10

copyright reserved



MISSOURI
BOTANICAL
GARDEN